AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A gait generating system for a mobile robot, the system determining a gait parameter, which is composed of a set of a plurality of parameters defining a gait of a mobile robot in a predetermined period, and generating a desired gait of the mobile robot in the predetermined period by using the determined gait parameter and a dynamic model of the mobile robot, comprising:

a control system having a gait generating device to generate the desired gait of the mobile robot, the gait generating device including:

a priority parameter required value determining means for determining a priority parameter required value, which is the value of a priority parameter to satisfy a requirement when the requirement related to the desired gait is given and a predetermined parameter out of the gait parameter is defined as the priority parameter while parameters except for the priority parameter are defined as non-priority parameters;

a base gait parameter setting means for setting, as a base gait parameter, either a gait parameter defining a reference gait of the mobile robot that is prepared beforehand or a gait parameter determined in the past so as to satisfy a predetermined boundary condition;

a priority parameter asymptotic means for updating the value of a priority parameter of the base gait parameter so as to cause the value to gradually approach the priority parameter required value in steps until the value agrees with the priority parameter required value; and

a new gait parameter determining means for determining in an exploratory manner a new gait parameter each time the value of the priority parameter is updated by the priority parameter asymptotic means, the new gait parameter being a gait parameter that has a priority parameter of the updated value and that allows a gait satisfying the predetermined boundary condition to be generated by using the dynamic model,

wherein if the number of updates of the value of a priority parameter by the priority parameter asymptotic means when the new gait parameter is newly determined is denoted by n (n: an integer satisfying $n \geq 1$), the value of the priority parameter obtained by n-th update processing is denoted by an n-th priority parameter updated value, a new gait parameter to be newly determined is denoted by an n-th new gait parameter, and the base gait parameter is denoted by a 0-th new gait parameter, then the new gait parameter determining means is a means that sets the value of a non-priority parameter to the value of the non-priority parameter of an (n-1)th new gait parameter, defines a gait parameter, in which the value of a priority parameter has been set to an n-th priority parameter updated value, as an initial search candidate gait parameter, and searches for the value of the search object parameter, which is a predetermined parameter among non-priority parameters of the initial search candidate gait parameter, such that the value satisfies the predetermined boundary condition, thereby determining an n-th new

gait parameter, and

the new gait parameter determined at the last update of the value of a priority parameter by the priority parameter asymptotic means is defined as the gait parameter defining the desired gait, and the desired gait is generated by using the new gait parameter and the dynamic model.

Claim 2 (currently amended): A gait generating system for a mobile robot, when generating a desired gait of a mobile robot in a predetermined period, the system determining a normal gait parameter, which is composed of a set of a plurality of parameters defining a normal gait, which is a virtual cyclic gait following the desired gait, and generating the desired gait such that the desired gait approximates a normal gait generated using the determined normal gait parameter and a dynamic model of the mobile robot, comprising:

a control system having a gait generating device to generate the desired gait of the mobile robot, the gait generating device including:

a priority parameter required value determining means for determining a priority parameter required value, which is the value of a priority parameter to satisfy a requirement, when the requirement related to a normal gait corresponding to the desired gait is input and a predetermined parameter out of the normal gait parameter is defined as the priority parameter while the parameters except for the priority parameter are defined as non-priority parameters;

a base normal gait parameter setting means for setting, as a base normal gait parameter, either a normal gait parameter defining a reference normal gait of the mobile robot that is prepared beforehand or a normal gait parameter

determined in the past so as to satisfy a predetermined boundary condition;

a priority parameter asymptotic means for updating the value of a priority parameter of the base normal gait parameter so as to cause the value to gradually approach the priority parameter required value in steps until the value agrees with the priority parameter required value; and

a new normal gait parameter searching means for determining in an exploratory manner, each time the value of the priority parameter is updated by the priority parameter asymptotic means, a new normal gait parameter, which is a normal gait parameter that has a priority parameter of the updated value and that allows a gait satisfying the predetermined boundary condition to be generated by using the dynamic model,

wherein if the number of updates of the value of a priority parameter by the priority parameter asymptotic means when the new normal gait parameter is newly determined is denoted by n (n: an integer satisfying $n \geq 1$), the value of the priority parameter obtained by the n-th update is denoted by an n-th priority parameter updated value, a new normal gait parameter to be newly determined is denoted by an n-th new normal gait parameter, and the base normal gait parameter is denoted by a 0-th new normal gait parameter, then the new normal gait parameter searching means is a means that sets the value of a non-priority parameter to the value of the non-priority parameter of an (n-1)th new normal gait parameter, and defines a gait parameter, in which the value of a priority parameter has been set to an n-th priority parameter updated value, as an initial search candidate gait parameter, and searches for the value of a search object parameter, which is a predetermined parameter among non-priority parameters of the initial search

candidate gait parameter such that the value satisfies the predetermined boundary condition, thereby determining an n-th new normal gait parameter, and

the new normal gait parameter determined at the last update of the value of a priority parameter by the priority parameter asymptotic means is defined as the normal gait parameter of a normal gait for the desired gait, and the desired gait is generated such that the desired gait approximates a normal gait to be generated by using the normal gait parameter and the dynamic model.

Claim 3 (original): The gait generating system for a mobile robot according to Claim 1, wherein the total number of updates of the value of a priority parameter by the priority parameter asymptotic means is set on the basis of the difference between the value of a priority parameter of the base gait parameter and the priority parameter required value.

Claim 4 (original): The gait generating system for a mobile robot according to Claim 2, wherein the total number of updates of the value of a priority parameter by the priority parameter asymptotic means is set on the basis of the difference between the value of a priority parameter of the base normal gait parameter and the priority parameter required value.

Claim 5 (original): gait generating system for a mobile robot according to Claim 1, wherein the gait parameter includes a parameter that defines a desired ZMP trajectory out of the desired gait as the search object parameter.

Claim 6 (original): The gait generating system for a mobile robot according to Claim 2, wherein the normal gait parameter includes, as the search object parameter, a parameter that defines a predetermined state amount of a motion of a mobile robot at one end of the period of one cycle of the normal gait.

Claim 7 (original): The gait generating system for a mobile robot according to Claim 1, wherein the predetermined boundary condition includes a condition in that a predetermined state amount of a motion of a mobile robot at a gait boundary in the predetermined period agrees with the predetermined state amount of the motion of the mobile robot in an adjoining gait at the boundary.

Claim 8 (original): The gait generating system for a mobile robot according to Claim 1, wherein the predetermined boundary condition includes a condition in that a predetermined state amount of a motion of a mobile robot at the boundary on the terminating end of a gait in the predetermined period agrees with the predetermined state amount of the motion of the mobile robot in the normal gait determined as a virtual cyclic gait that is to follow the gait.

Claim 9 (original): The gait generating system for a mobile robot according to Claim 2, wherein the predetermined boundary condition includes a condition in that a predetermined state amount of a motion of a mobile body at the starting end of one cycle of the normal gait and that at the terminating end thereof agree with each other.

Claim 10 (previously presented): The gait generating system for a mobile robot according to Claim 6, wherein the mobile robot is a legged mobile robot equipped with a plurality of legs extended from its body, and the predetermined state amount includes at least one of the position of the body of the robot, the velocity of the body, the posture angle of the body, the angular velocity of the posture angle of the body, the weighted mean values of the position and the velocity of the body, the position of the total center-of-gravity of the robot, the velocity of the total center-of-gravity, the weighted mean values of the position and the velocity of the total center-of-gravity, and a divergence component.

Claim 11 (previously presented): The gait generating system for a mobile robot according to Claim 7, wherein the mobile robot is a legged mobile robot equipped with a plurality of legs extended from its body, and the predetermined state amount includes at least one of the position of the body of the robot, the velocity of the body, the posture angle of the body, the angular velocity of the posture angle of the body, the weighted mean values of the position and the velocity of the body, the position of the total center-of-gravity of the robot, the velocity of the total center-of-gravity, the weighted mean values of the position and the velocity of the total center-of-gravity, and a divergence component.

Claim 12 (previously presented): The gait generating system for a mobile robot according to Claim 8, wherein the mobile robot is a legged mobile robot equipped with a plurality of legs extended from its body, and the predetermined state amount includes at least one of the position of the body of the robot, the velocity of

the body, the posture angle of the body, the angular velocity of the posture angle of the body, the weighted mean values of the position and the velocity of the body, the position of the total center-of-gravity of the robot, the velocity of the total center-of-gravity, the weighted mean values of the position and the velocity of the total center-of-gravity, and a divergence component.

Claim 13 (previously presented): The gait generating system for a mobile robot according to Claim 9, wherein the mobile robot is a legged mobile robot equipped with a plurality of legs extended from its body, and the predetermined state amount includes at least one of the position of the body of the robot, the velocity of the body, the posture angle of the body, the angular velocity of the posture angle of the body, the weighted mean values of the position and the velocity of the body, the position of the total center-of-gravity of the robot, the velocity of the total center-of-gravity, the weighted mean values of the position and the velocity of the total center-of-gravity, and a divergence component.